

CLAIMS

We Claim:

1. An extreme ultraviolet lithography system comprising:
a reticle having a top and a bottom surface;
5. a plurality of chambers for storing or utilizing the reticle; and
a top plate and a bottom plate that are proximate to the top and bottom surface of the reticle, respectively, the top and bottom plate being maintained at a lower temperature than a temperature of the reticle, wherein the reticle is thermophoretically protected from contamination.
10. 2. A system as recited in claim 1 wherein the top plate and the bottom plate each have a surface area that is at least as large as a surface area of the reticle.
3. A system as recited in claim 1 wherein the bottom plate further comprises:
a plurality of support stems that support the reticle in between the top plate and the bottom plate.
15. 4. A system as recited in claim 1 further comprising:
a reticle handler suitable for transporting the reticle, the reticle handler supporting the top plate and the bottom plate in substantially coplanar relative positions,
the reticle handler supporting the reticle in between the top plate and the
20. bottom plate, wherein the reticle handler transports the reticle while being in between the top plate and the bottom plate so that the reticle is thermophoretically protected from contaminants during transit.
5. A system as recited in claim 2 wherein the top plate is removable from the reticle handler so that the top surface of the reticle can be exposed.
25. 6. A system as recited in claim 1 further comprising:
a pod for storing the reticle, the pod including a cover that can be joined with the bottom plate to enclose the reticle and the top plate within the cover and the bottom plate, wherein the top plate is suspended between the top surface of the reticle and the cover.
30. 7. A system as recited in claim 6 wherein the cover is also maintained at a lower temperature than the temperature of the reticle.
8. A system as recited in claim 6 wherein the bottom plate is transparent, the system further comprising:

a light source that directs light rays through the bottom plate and towards the reticle in order to add heat to the reticle.

9. A system as recited in claim 6 further comprising:

5 a heating element positioned proximate to an edge of the reticle wherein the heating element adds heat into the reticle.

10. A system as recited in claim 6 further comprising:

an optical power source; and
an optical fiber having a first end that is connected to the optical power source and a second end that is positioned proximate to an edge of the reticle, wherein the
10 optical fiber transfers light from the power source to the edge of the reticle, whereby the light adds heat into the reticle.

11. A system as recited in claim 6 further comprising:

an electrical device connected to the reticle, the electrical device configured to electrically ground the reticle.

15 12. A system as recited in claim 1 wherein one of the chambers is a storage chamber for storing the reticle, the storage chamber including the top plate and the bottom plate, which are positioned proximate to the top and the bottom surfaces of the reticle, respectively.

13. A system as recited in claim 12 wherein the storage chamber further
20 comprises: side walls and a gate valve that, together with the top and bottom plates, enclose the reticle within the storage chamber, the gate valve being suitable for opening and closing so that the reticle can be inserted and removed from the storage chamber.

14. A reticle handler for transporting a reticle comprising:

25 a support arm that supports a top plate and a bottom plate in substantially coplanar relative positions such that the reticle can be supported between the top plate and the bottom plate, the top and bottom plate being maintained at a lower temperature than a temperature of the reticle, wherein the reticle handler transports the reticle while being in between the top plate and the bottom plate so that the reticle
30 is thermophoretically protected from contaminants during transit.

15. A reticle handler as recited in claim 14 wherein the top plate and the bottom plate each have a surface area that is at least as large as a surface area of the reticle.

16. A reticle handler as recited in claim 14 wherein the bottom plate further comprises:

a plurality of support stems that support the reticle in between the top plate and the bottom plate.

17. A reticle handler as recited in claim 14 wherein the top plate is removable from the reticle handler so that the top surface of the reticle can be exposed.

5 18. A reticle handler as recited in claim 14 further comprising:
a cooling unit having a pocket suitable for receiving the top plate and the bottom plate, wherein the cooling unit cools and maintains the top and bottom plates at a relatively low temperature.

19. A pod for storing a reticle comprising:
10 a top plate and a bottom plate that are suspended in a substantially coplanar orientation relative to each other such that the reticle can be positioned between the top plate and the bottom plate, wherein the top plate and the bottom plate are maintained at a lower temperature than a temperature of the reticle so that the reticle is thermophoretically protected from contamination; and

15 a cover that joins together with the bottom plate to enclose the reticle and the top plate within the top cover and the bottom plate.

20. A pod as recited in claim 19 wherein the top plate and the bottom plate each have a surface area that is at least as large as a surface area of the reticle.

21. A pod as recited in claim 19 wherein the bottom plate further comprises:
20 a plurality of support stems that support the reticle in between the top plate and the bottom plate.

22. A pod as recited in claim 19 further comprising:
a filter that sets upon the bottom plate and encloses the top plate and the reticle within the filter and the bottom plate, the filter fitting within the cover and
25 serving to protect the reticle from contaminants.

23. A pod as recited in claim 19 wherein the bottom plate is transparent, the pod further comprising:

a light source that directs light rays through the bottom plate and towards the reticle in order to add heat to the reticle.

30 24. A pod as recited in claim 19 further comprising:
a heating element positioned proximate to an edge of the reticle wherein the heating element adds heat into the reticle.

25. A pod as recited in claim 19 wherein the bottom plate is a removable cover that is attached to and covers a bottom surface of the reticle.

26. A pod as recited in claim 25 wherein the removable cover is formed of a transparent material.
27. A pod as recited in claim 25 wherein the removable cover is maintained at a lower temperature than a temperature of the reticle so that the reticle is thermophoretically protected from contamination.
28. A pod as recited in claim 25 wherein the removable cover has a cover surface that covers the bottom surface of the reticle wherein a small gap is maintained between the cover surface and the bottom surface of the reticle.
29. A pod as recited in claim 28 wherein the small gap is approximately a few millimeters.
30. A pod as recited in claim 25 further comprising:
a top removable cover that covers a top surface of the reticle.
31. A lithography system comprising:
a reticle chamber that contains a reticle, the reticle being maintained at a reticle temperature, the reticle chamber being maintained at a temperature that is lower than the reticle temperature such that the reticle is thermophoretically protected from contamination; and
an optics chamber that is connected to the reticle chamber through a passageway, the optics chamber containing at least one optical lens for directing ultraviolet radiation through the passageway and towards the reticle.
32. A lithography system as recited in claim 31 further comprising:
a pair of blinds positioned about the passageway, wherein the blinds can separate to leave the passageway open and close to block the passageway.
33. A lithography system as recited in claim 32 wherein the pair of blinds is also maintained at a temperature that is lower than the reticle temperature.
34. A lithography system as recited in claim 31 wherein the reticle chamber is maintained at a low-pressure level, the low-pressure level having a minimum pressure level approximately equal to a low vacuum.
35. A lithography system as recited in claim 34 wherein the optics chamber is maintained at a pressure level that is lower than the pressure level maintained in the reticle chamber.
36. A lithography system as recited in claim 32 further comprising:
a pair of heat shields wherein each heat shield covers and protects a respective one of the blinds from heat absorbed from the ultraviolet radiation.

37. A lithography system comprising:
a pod suitable for containing a reticle;
a loadlock chamber having a first surface that contains a first gate valve,
wherein the pod is attached to the first surface of the loadlock chamber, and wherein
5 the first gate valve allows the reticle to be transferred from the pod into the loadlock
chamber; and
a lid that seals the pod between the lid and the first surface of the loadlock
chamber such that a low pressure environment can be formed around the pod.
38. A lithography system as recited in claim 37 wherein the loadlock chamber
10 further comprises:
a second gate valve that can be selectively opened to allow a reticle handler to
transport a reticle into and out of the loadlock chamber.
39. A lithography system as recited in claim 37 wherein the pod has an
equalization port that allows for pressure equalization between an inside volume of
15 the pod and a volume outside of the pod.
40. A lithography system comprising:
an illumination source;
an optical system;
a reticle stage;
20 a working stage arranged to retain a workpiece;
an enclosure that surrounds at least a portion of the working stage, the
enclosure having a sealing surface;
a reticle having a top and a bottom surface; and
a top plate and a bottom plate that are proximate to the top and bottom surface
25 of the reticle, respectively, the top and bottom plate being maintained at a lower
temperature than a temperature of the reticle, wherein the reticle is thermophoretically
protected from contamination.
41. An object manufactured with the lithography system of claim 40.
42. A wafer on which an image has been formed by the lithography system of
30 claim 40.
43. A method for making an object using a lithography process, wherein the
lithography process utilizes a lithography system as recited in claim 40.
44. A method for patterning a wafer using a lithography process, wherein the
lithography process utilizes a lithography system as recited in claim.